SAMPLE PAPER
(SELF ASSESSMENT)

CBSE - Class 10

MATHEMATICS
(STANDARD)

Time Allowed: 3 Hours   *Maximum Marks: 80*

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 40 questions divided into four sections A, B, C & D.

(iii) Section A contains **20** questions of **1** mark each, Section B comprises of **6** questions of **2** marks each. Section C comprises of **8** questions of **3** marks each. Section D comprises **6** questions of **4** marks each.

(iv) There is no overall choice. However internal choices have been provided in **two** questions of **1** marks each, **two** questions of **2** marks each, **three** questions of **3** marks each and **three** questions of **4** marks each. You have to attempt only one of the alternatives in all such questions.

(v) Use of calculators is **not** permitted.

SECTION - A

**Q 1 – 10 are multiple choice questions. Select the most appropriate answer from the given options.**

1. The zeros of the quadratic polynomial $x^2 + 99x + 127$ are: **1**

(A) both equal   (B) both negative

(C) both positive   (D) one positive and one negative

2. If the lines given by $3x + 2\lambda y = 2$ and $2x + 5y + 1 = 0$ are parallel, then the value of λ is: **1**

(A) $\dfrac{-5}{4}$ (B) $\dfrac{2}{5}$ (C) $\dfrac{15}{4}$ (D) $\dfrac{3}{2}$

3. Which term of the AP: 1, 4, 7, ... is 88?   **1**

(A) 26   (B) 27   (C) 30   (D) 35

4. If the points A(1, 2), O(0, 0) and C(a, b) are collinear, then: **1**

(A) $a = b$ (B) $a = 2b$ (C) $2a = b$ (D) $a = -b$

5. A line which is perpendicular to the radius of the circle through the point of contact, is called a: **1**

(A) tangent   (B) chord   (C) normal   (D) segment

6. If the perimeter and the area of a circle are numerically equal, then the radius of the circle is: **1**

(A) 2 units   (B) π units   (C) 4 units   (D) 7 units

7. The perimeter of a semi-circular disc of radius 3.5 cm is: **1**

(A) 18 cm   (B) 18 sq cm   (C) 11 cm   (D) 11 sq cn

8. The curved surface area of a right circular cone shown in the figure is: **1**

(A) $\pi r(h + r)$ sq units   (B) $\pi r l$ sq units

(C) $\dfrac{1}{3}\pi r^2 h$ sq units   (D) $\dfrac{1}{3}\pi r^2 l$ sq units
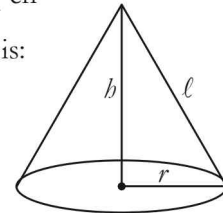
9. Four cubes each of side 2 cm are joined end to end. The total surface area of the cuboid so formed is: **1**

(A) 72 sq cm   (B) 32 sq cm   (C) 36 sq cm   (D) 54 sq cm

10. If a number is chosen from first 24 natural number and its probability is $\dfrac{1}{2}$. Which of the following is **not** correct?   **1**

(A) Number is even.

(B) Number is odd.

(C) Number is greater than or equal to 12.

(D) Number is greater then 12.

(Q 11 – 15) Fill in the blanks:

11. If one of the three equal zeros of the polynomial $p(x) = x^3 - d$ is 2, then the value of d is **1**

OR

If $\dfrac{a_1}{a_2}$ .... $\dfrac{b_1}{b_2}$, then the system of equations $a_1 x + b_1 y + c_1 = 0$ and $a_2 x + b_2 y + c_2 = 0$ has a unique solution.   **1**

12. Median class of the following data is **1**

Marks	0–20	20–40	40–60	60–80	80–100
Number of students	5	15	30	8	2

13. Discriminant of $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$ is **1**

14. $\sin 2A = 2 \sin A$ is true when A = ...   **1**

15. In "less than" type ogive, the cumulative frencies are plotted against .... of the concerned classes.   **1**

(Q 16 – 20) Answer the following:

16. Find the value of k for which the quadratic equation: **1**

$2x^2 + kx + 8 = 0$ has equal roots.

17. Find the number of terms in the finite AP: 4, 12, 20, ····· 100.   **1**

<div align="center">OR</div>

Find the zeros of the polynomial $p(x) = 100x^2 - 81$.   **1**

18. If $\sqrt{3} \tan \theta = 3 \sin \theta$, then find the value of $\sin^2 \theta - \cos^2 \theta$.   **1**

19. Determine the **mode** of the given data: **1**

Class	0–20	20–40	40–60	60–80
Frequency	15	6	18	10

20. In a leap year, find the probability that there are 53 Sundays in the year.   **1**

SECTION - B

21. Using Euclid's Division Algorithm, find the HCF of 525 and 3000.   **2**

<div align="center">OR</div>

Write whether every positive integer can be of the form $4q + 2$, where q is an integer. Justify your answer.   **2**

22. The decimal expansion of the rational number $\dfrac{359}{2 \times 5^4}$, will terminate after how many places of decimal?   **2**

23. Prove that $5 - 2\sqrt{3}$ is an irrational number, assuming that $\sqrt{3}$ is irrational.   **2**

24. A copper wire when bent in the form of a square encloses an area of 121 sq cm. If the same wire is bent into the form of a circle, find the area of the circle. (Use $\pi = \dfrac{22}{7}$)   **2**

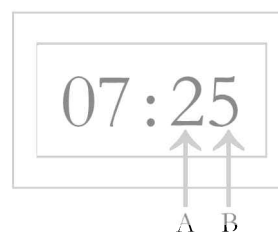**25.** Given that ΔPQR is similar to ΔBAR, find the value of x and y.   **2**
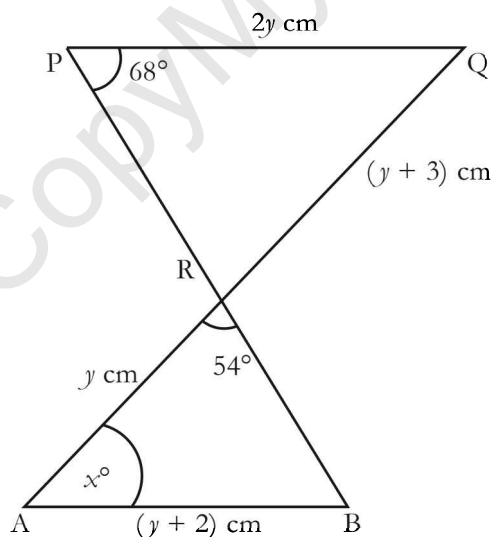
26. A bag contains 24 balls of which x are red, $2x$ are white and $3x$ are blue. A ball is drawn at random. Find the probability that the drawn ball is white.   **2**

26. Amrish wakes up in the morning and notices that his digital clock reads 07: 25 am.

After noon, he looks at the clock again.

What is the probability that:

i.   the number in column A is a 4?

ii.   the number in column B is an 8?   **2**

SECTION - C

27. Find the roots of $\dfrac{1}{x} - \dfrac{1}{x-2} = 3$ $(x \neq 0, 2)$ **3**

28. Find a natural number whose square diminished by 84 is equal to thrice of 8 more than the given number.   **3**

29. Check if $g(x) = x^2 - 2$ is a factor of $p(x) = x^3 - 3x^2 + 5x - 3$.   **3**

OR

If the zeros of the polynomial $p(x) = x^3 - 3x^2 + x + 1$ are $a - b$, a, $a + d$, then find the values of a and b.   **3**
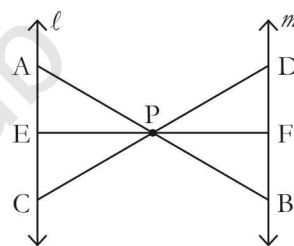
30. If $5 \cos A - 12 \sin A = 0$, then find the value of: $\dfrac{\sin A + \cos A}{2 \cos A - \sin A}$ **3**

OR

If $A = 30°$, verify that $\sin 3A = 3 \sin A - 4 \sin^3 A$.   **3**

31. In the given figure, ℓ and m are parallel lines and line segments AB, CD and EF are concurrent at point P.

Prove that : $\dfrac{AE}{BF} = \dfrac{AC}{BD} = \dfrac{CE}{FD}$.   **3**

32. Draw a triangle ABC in which BC = 6 cm, CA = 5 cm and AB = 4 cm. Construct a triangle similar to ∆ABC and of scale factor $\dfrac{5}{3}$.   **3**

33. Find the third vertex of a triangle if its two vertices are (–1, 4) and (5, 2) and mid-point of one side is (0, 3).   **3**

OR

For the ∆ABC where vertices A(4, –6), B(3, –2) and C(5, 2), verify that a median of ∆ABC divides it into two triangles of equal areas.   **3**

34. The figure shows a wax candle in the shape of right circular cone with base radius 5 cm and height 12 cm. It takes 1 hour 40 minutes to burn completely.   **3**

After $12\dfrac{1}{2}$ minutes of burning, the candle is reduced to a frustum with a height of h cm.
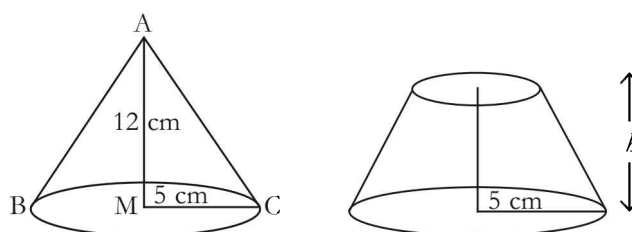
Find:

i. the volume of the candle, before burning;

ii. the total surface area of the candle, before burning;

iii. The value of h.

SECTION - D

35. Find whether the following pair of linear equations has a unique solution. If yes, find the solution $7x - 4y = 49$ and $5x - 6y = 57$.   **4**

OR

A train takes 2 hours less for a journey of 300 km, if its speed is increased by 5 km/h from its usual speed. Find the usual speed of the train.   **4**

36. A kite is flying at a height of 60 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°. Find the length of the string, assuming that there is no slack in the string.   **4**

37. A hemispherical tank, of diameter 3 m, is full of water. If is being emptied by a pipe at the rate of $3\frac{4}{7}$ litres/sec. How much time will it take to make the tank half empty. [Use $\pi = \frac{22}{7}$]   **4**

38. Prove that, if a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, the other two sides are divided in the same ratio. State the converse of this theorem.   **4**

OR

Prove that, the ratio of areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.   **4**

39. Calculate the missing frequencies f_1 and f_2 from the following data, if the mean daily expenditure of 100 families is ₹188.   **4**

Expenditure (in ₹)	140–160	160–180	180–200	200–220	220–240
Number of families	5	25	f_1	f_2	5

Also, determine the **modal** daily expenditure of families.

40. The perpendicular from A on side BC of a ∆ABC intersects BC at D such that BD = 3DC.   **4**

Prove that:

$$2AB^2 = 2AC^2 + BC^2.$$

OR

A circle is touching the side BC of ∆ABC at P and touching AB and AC produced at Q and R respectively.   **4**

Prove that:

$$AQ = \frac{1}{2} \text{ (Perimeter of ∆ABC)}$$